Small Business Innovation Research/Small Business Tech Transfer

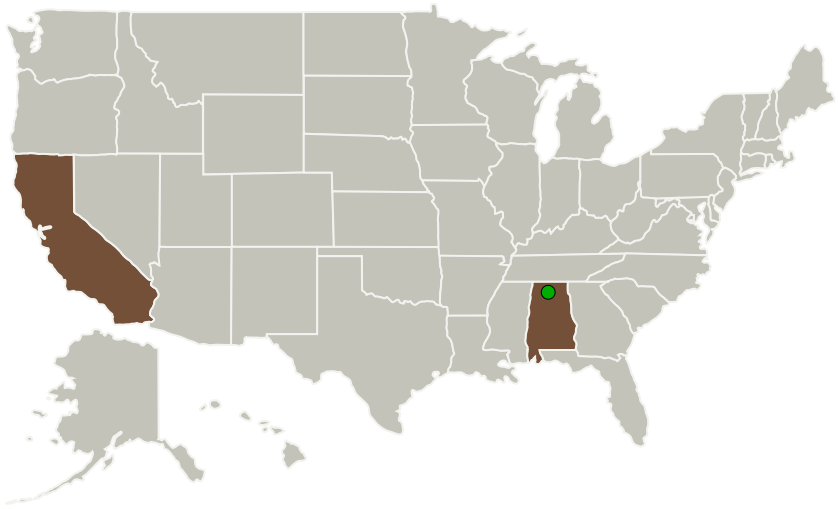
Advanced X-ray Telescope Material System, Phase I

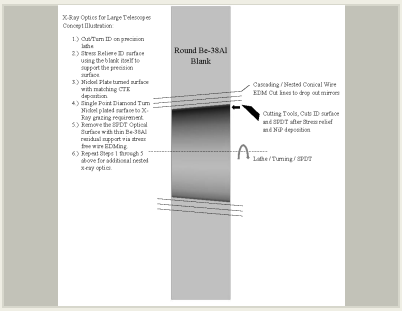
Completed Technology Project (2016 - 2016)

Project Introduction

Peregrine proposes the combination and use of of Be-38Al, electroless nickel plating, and single point diamond turning to create precision x-ray grazing optical surfaces. Large x-ray telescopes will demand large, high stiffness, and lightweight substrates to provide rigidity to support the production of nested optical surfaces while requiring accurate alignment through the use of stable support structures. Ideally, these nested x-ray mirrors would be of heavy metal, microns in thickness and be self-supporting through launch, this is currently impractical. However, near ideal x-ray optics can be produced with the low density material of Be-38Al backing a thin layer of electroless nickel with precision single point diamond turned surfaces. The use of Be-38Al can yield lightweight, precise, and stable substrates. Coefficient of thermal expansion matching electroless nickel can be deposited thinly on top of the Be-38Al substrates, and then single point diamond turned to optical finishes. In addition, Be-38Al is a proven structural material that can be readily fabricated into precision members to create support structures to align and create entire large, athermal x-ray telescopes.

Primary U.S. Work Locations and Key Partners





Advanced X-ray Telescope Material System, Phase I

Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Advanced X-ray Telescope Material System, Phase I

Completed Technology Project (2016 - 2016)

Organizations Performing Work	Role	Type	Location
The Peregrine Falcon Corporation	Lead Organization	Industry	Pleasanton, California
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	California

Project Transitions

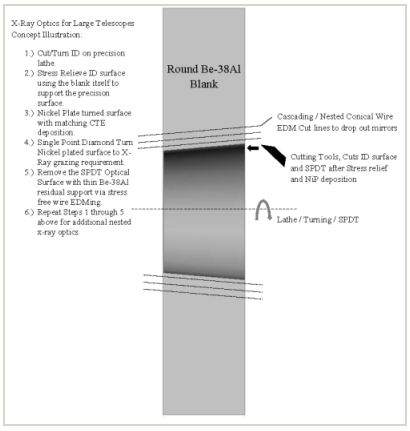
June 2016: Project Start

December 2016: Closed out

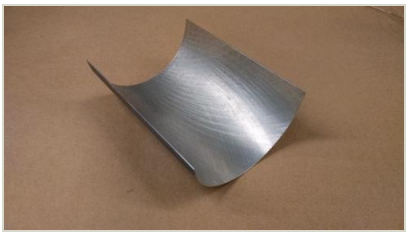
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140470)*

Images



Briefing Chart Image
Advanced X-ray Telescope Material System, Phase I
(https://techport.nasa.gov/image/130546)



Final Summary Chart Image
Advanced X-ray Telescope Material System, Phase I Project Image
(https://techport.nasa.gov/image/134062)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
The Peregrine Falcon Corporation

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

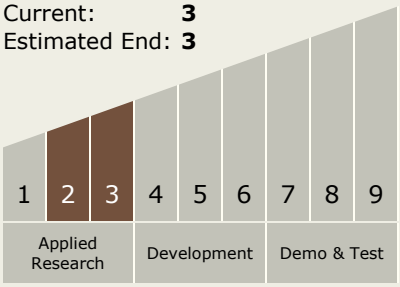
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Robert Hardesty

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Advanced X-ray Telescope Material System, Phase I

Completed Technology Project (2016 - 2016)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System